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Alternative-substitute business models and the provision of local infrastructure: Alterity as a solution to financialization and public-sector failure

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ABSTRACT

Everyday living is supported by an array of services provided by a complex local infrastructure nexus that is financed and funded by the public, private and third sectors. The on-going debate on the financialization of infrastructure has neglected to explore the provision of local infrastructure in places experiencing infrastructural exclusion. This paper seeks to contribute toward filling this gap by exploring local infrastructure in the UK that has been provided by blending non-capitalist with capitalist activities. In other words, the provision of local infrastructure using an 'alternative' approach that attempts to address infrastructure exclusion by filling gaps in the provision of local infrastructure. The question is: how is infrastructure provided when it does not meet either a value for money calculation undertaken by the state or does not meet the investment criteria required by capital markets? This paper is the first to develop a dialogue between three unrelated literatures - financialization, business models and alterity – by developing a conceptual framework for exploring local infrastructure that is provided by alternative-substitute business models. The paper explores this approach through the analysis of two alternative infrastructure projects – Broadband 4 the Rural North and Malvern's heritage gas lamps.

1. Introduction

Everyday living, including reproduction, work and leisure, or liveability and livelihoods, is supported by an array of services provided by a complex local infrastructure nexus (Amin and Thrift, 2017: 9). This includes the provision of water, power and waste services, parks and libraries and access to infrastructures enabling connectivity (Barratt and Whitelaw, 2011). Infrastructure provides a service, for example warmth, but also a commodity, energy that may be provided by the public or private sectors and may be converted in to an investment asset (Torrance, 2009).

After the 2008 Global Financial Crisis, research on property and infrastructure began to explore the "uneven spatial, social and political outcomes of redevelopment projects" as a process of financialization driven by a concern with the maximisation of profit (Guironnet et al., 2016: 1443). Not all infrastructure can be provided for profit or through collective provision and not all places have access to the same type or quality of infrastructure. In places experiencing infrastructure exclusion, residents and businesses must live without some infrastructure services or develop alternative solutions. Several strands in the literature of urban studies have explored the relationship between capital markets and urban outcomes. Research on property development and investment has highlighted the activities of institutional investors (pension funds, insurance companies) in determining what, when and where investment occurs (Bryson, 1997; Weber and Alfen, 2010). This capture of infrastructure and commercial property by institutional investors has been traced back to 1947 (Bryson et al., 2017a: 467) with waves of privatisation transforming publicly owned goods into financial commodities (Torrance, 2009; Weber, 2010). In the introduction to their special issue on financialization and urban production, Halbert and Attuyer, note that the body of literature on financialization "does not constitute an exhaustive or integrated body of work" and that there is a need for further empirical studies and to "reflect on the methodological and conceptual challenges that remain" (2016: 1348) We agree,

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but, in addition, there is a need to consider alternatives to financialization (Mitchell, 2008: Lee et al., 2008; Jones, 2010).

This paper seeks to contribute toward filling these two gaps by exploring local infrastructure in the UK that has been provided by blending non-capitalist with capitalist activities. In other words, the provision of local infrastructure using an "alternative" non-financialized approach that attempts to overcome infrastructure exclusion. The question is: how is infrastructure provided when it does not meet either a value for money calculation undertaken by the state or does not meet the investment returns required by capital markets? This is to argue that a dialogue needs to be undertaken between the debate on financialization and the literature that "seeks to build an alternative discourse of the economy" (Leyshon and Lee, 2003: 6).

Cities and rural areas are complex interconnected networks of infrastructure. Some represent soft infrastructure based on the provision of services by people, for example schools, hospitals and theatres, and others are hard infrastructure – roads, railways, pipes and cables (Amin and Thrift, 2017). The diversity and complexity of local infrastructure requires a methodological framework that will support comparative analysis. This paper is the first to develop a dialogue between a strand of literature in the field of business strategy and competitive advantage on business models and transaction content (Zott and Amit, 2010; Foss and Saebi, 2015; Baden-Fuller and Mangematin, 2013) and debates in economic geography on alterity (Gibson-Graham, 1996, 2008; Jones, 2010) and financialization (Torrance, 2009; Guironnet et al., 2016; Halbert and Attuyer, 2016; Theurillat et al., 2016; Bryson et al., 2017a). The literature on infrastructure in economic geography and urban studies has been grounded in debates on privatisation and financialization rather than business models. This is unfortunate. Much of this literature makes *indirect* reference to the components of a business model. Thus, O'Neill notes that:

> "The direction beckoned by privatised and financialised infrastructure now seems likely to be dominated by assets which are owned and managed privately; organised into discrete functional and organisational entities; have monetised costs and returns; have known and apportioned financial and operational risks … " (2018: 356). These are all elements of a business model, but there is no attempt to position this account of infrastructure within the business model literature and no appreciation of alternative modes of infrastructure financing. A business model provides an account "of how a firm organises itself to create and distribute value in a profitable manner" (Baden-Fuller and Morgan, 2010: 157). The emphasis is placed on understanding the process and appropriation of value creation, defined in monetary terms (Teece, 2010). In this paper, the application of a business model approach to exploring infrastructure provides, for the first time, a structured approach to identifying, exploring, critiquing, comparing and contrasting conventional and alternative ways of organising, financing and funding infrastructure of all types.

This paper develops and applies a innovative conceptual framework for understanding the ways in which individuals and local communities come together to develop 'alternative' solutions to the provision of local infrastructure. The use of the term 'alternative' emphasises that these are novel, innovative non-mainstream or unconventional approaches (Jones, 2010). 'Non-monetised' inputs reflect civic activity involving investments of time, labour and assets without expectation of monetary return, but rather the ability to access services provided by local infrastructure. These non-monetised elements may be small, or temporary, but are essential inputs into the creation and operation of alternative local infrastructure business models. An alternative local business model may be embedded within a conventional infrastructure business model; a process of transition may occur in which the 'alternative investments' act as substitutes for capital. Alternative infrastructure business models may emerge with technological innovations that create new forms of infrastructure, for example broadband, or may be in response to the withdrawal of state financing or funding.

Our concern, in this paper is to identify and explore alternative local infrastructure business models by developing a dialogue between three literatures – infrastructure studies, alterity and business models. Accordingly, the paper is in six parts. In the second part, we explore the relationship between the alterity and business model literatures with a focus on non-capitalist activities and non-monetized inputs. The third part outlines the research design and methodology. This includes the identification and analysis of 142 local infrastructure projects. In the fourth part of the paper, an analysis of 58 infrastructure projects is undertaken to develop a conceptual framework to identify the heterogeneity of the sources of monetized and non-monetized finance and funding inputs, as well as the key decision-making points, in alternative local infrastructure business models. The fifth section, applies this framework to explore the role that non-capitalist activities play in the finance and funding of two local infrastructure projects. These examples have been selected from the 58 projects that include non-capitalist features and each makes a different contribution to the development of our argument. The first, Broadband 4 the Rural North (B4RN), is an application of non-capitalist activities to ensure that broadband services are available in an area excluded from mainstream provision. This is about extending the reach of what has become an essential service. The second, Malvern Gas Lamps, represents relic infrastructure that would have been replaced by LED lighting without non-monetized inputs transforming the technology. Finally, we review the empirical and theoretical findings as well as policy and academic implications.

2. Alterity, diversity and alternative-substitute business models

The most powerful case for the importance of so-called 'alternative' economic and political practices was made by J.K. Gibson-Graham, a hybrid subject formed of Kathy Gibson and Julie Graham, when they argued that:

> " … one must represent economic practice as comprising a rich diversity of capitalist and non-capitalist activities and argue that the non-capitalist ones had been relatively 'invisible' because the concepts and discourses that could make them 'visible' have themselves been marginalized and suppressed" (1996: xi).

This led to a rich body of literature that explored alternatives in the social economy, financial services, retail, work, exchange and employment spaces, lifestyles and the diverse economy (Leyshon et al., 2003; Gibson-Graham, 2006; Lee et al., 2008; Fuller et al., 2010).

'Alterity' emerged from this debate as an approach to the identification and analysis of alternatives and as a discussion of the extent to which 'alternatives' are considered as alternatives by those involved with them. Thus, there may be many ways, or business models, of providing a service via local infrastructure. These might reflect alternatives as there might be some degree of choice. The place-based fixity of infrastructure implies that, for some places, alternative local infrastructure business models exist that are additional to established practices, but, in some places, there is no alternative to the alternative. This mirrors Fuller and Jones (2003) in their identification of three types of alternative institution: first, *alternative –oppositional* institutions are actively engaged in the process of being alternative – with values and ideologies that reject the mainstream; second, *alternative-additional* institutions provide an additional choice to other extant institutions whilst not necessarily developing values that reject the mainstream; and third, *alternative-substitute* institutions act as a substitute for institutions that are no longer present or have never existed in a place (Fuller and Jones, 2003: 57). The latter represents coping mechanisms or survival strategies (Williams and Round, 2007) rather than an attempt to be alternative and it is this group that is central to our analysis of alternative local infrastructure business models. Alternative-substitute infrastructure business models are place-based solutions developed locally to provide people with access to infrastructure enabled

services that are unavailable locally or to preserve existing service provision. These are 'alternative-substitute' as there is no alternative-additional choices available apart from going without and also no adequate alternative-additional institutions available. For people living in places in which infrastructure is unavailable then the only solution is to go without or to create a local substitute institution.

The writings of Gibson-Graham have been extremely influential in encouraging research on alternative forms of economic practice, but the alerity debate has not featured in the literature on business models. In the language of alterity, business models would be labelled as capitalist and too profit focussed. The business model literature provides a structured approach to exploring the delivery of transaction content that can be applied to understanding the emergence and functioning of alternative institutions This offers an interesting opportunity to develop a dialogue between a literature that emphasis monetary value with one focussed on alternative values. Every business model includes three related elements that form a value or profit creation process (Teece, 2010). First, the *value proposition*, or *transaction content* (Zott and Amit, 2010), is the distinctive contribution made by an organisation in the value creation process. This includes the types of solutions provided or promised by the organisation to its customers or beneficiaries. The second element involves the identification, creation, co-ordination and management of a *value network* of interconnected relationships that form a nexus of interactions or a value chain. This includes the firms or partners involved in the delivery of the value proposition. The competitiveness of a value proposition may be founded within the composition of the value network. This transfers competition from the arena of the firm to the identification and co-ordination of a value network that has been assembled to deliver or manage a project. This shift from firm to network reflects the ability of the network to access sources of financial capital, to spread the risk across the network, to access specialist expertise and to draw upon established private/public sector relationships. Conventional infrastructure service business models include finance and funding that is provided by direct taxation and finance provided by the private sector linked to user fees. The third element is *monetization*, often labelled as a value-capturing mechanism or revenue model (Baden-Fuller and Haefliger, 2013: 422). The revenue model describes the various ways in which a firm monetizes the value proposition.

The business model literature places considerable emphasis on different forms of value – propositions, networks and value-capture. But, these are very different 'values'; in this literature value is everything and perhaps nothing. Thus, a value proposition or transaction content (use value) is produced to appropriate 'exchange' value (revenue/profit) through the creation of a 'value' network (which shares profit/risks) or some form of production network. These are three types of value here – (i) use, (ii) value created through a production network and (iii) exchange/appropriation. The first type, the value proposition, is experiential, symbolic, performative and cultural. These values are tangible and intangible and are socially constructed (Zeilzer, 1997). The second type, the value network or transaction structure and governance, is an operational definition of value defined by firms/individuals coming together to create some form of production network to allocate risks and rewards. This is a dynamic process that is conflictual involving unequal and asymmetric relationships and is perhaps path dependent. A key question involves which groups can control the process and appropriate most of the value for the least risk.

The third type, monetarization, is defined or measured predominately in monetary terms but the degree of monetary value appropriated reflects the outcome of conflict amongst those participating in the value network, but also markets and the mediation between production and consumption (Slater and Tonkiss, 2001). Money is a tool for calculation but also has nonpecuniary values connected to personal, social or sacred life (Zelizer, 2012) and which are distinct to pecuniary values. To Zelizer these are reflected in the management and allocation of expenditure with the implication being that "not all dollars are the same" (1997: 11); money is reciprocally influenced by cultural and social factors that lie outside the market (Dodd, 2014: 288). The difficulty is that 'value' should not be solely equated with price or monetarization as 'value' is not just an economic concept but is also a social and cultural construct. To Slater and Tonkiss economics has much to say about price but nothing to say about value (2001: 49). Value involves trust, sharing, community and is performative, disparate and conflictual (Boltanski and Esquerre, 2015; Mazzucato, 2018).

The identification of the various elements that comprise a business model provides a useful comparative methodological framework for exploring both capitalist and non-capitalist activities, but further clarification is required regarding the interpretation of disparate values. The business model literature has focussed predominantly on studies of firms that are engaged in market-based relationships (Teece, 2010; Foss and Saebi, 2015) focusing on monetization. Several studies of business models have highlighted that 'value' creation might not necessarily be related to profit-making (Baden-Fuller and Haefliger, 2013, Baden-Fuller and Mangematin, 2013), but the focus here is on double or triple bottom lines. A study of business models and private hospitals shows how a for-profit business model generates social outcomes (Velamuri et al., 2015). But, this is still a conventional for-profit business based on Fordist principles of scale and quality (Baden-Fuller and Mangematin, 2013). Similarly, Baden-Fuller and Haefliger (2013), show how some technology-based businesses, or multisided business models, enable consumers to access services without payment while providing services for sale, for example Google or Facebook. The multi-sided business model literature focuses on for-profit business highlighting different methods of engaging with consumers and capturing value (Rochet and Tirole, 2006).

The business model literature has yet to conceptualise value and to include within this discussion non-pecuniary inputs and the emergence of what can be termed '*alternative-substitute business models*' (ASBM). This is unfortunate as ASBMs reflect innovations that have the potential to reconfigure capitalism itself through the development of localised place-based solutions. Here it is important to appreciate the emphasis that is placed on non-monetised inputs in terms of participants in a ASBM value network. These business models may eventually develop a monetized revenue element, but this is not the primary driver behind the development of the model. The driver is the inability to access services supplied by a mainstream business model.

The alterity and the business model literatures are distinct debates; to our knowledge there has been no communication between these very different conceptual debates. This means that participants to either of these debates may find it difficult to relate to our argument. This is not a conventional paper on business models nor is it a conventional paper on alterity. Research on alternatives has gone some way to revealing 'invisible' non-capitalist activities, but more research is needed to identify the extent, structure and complexity of these activities. A business model approach applied to the alterity debate provides a comparative framework for identifying and comparing alternatives based on the identification of transaction content, structure/governance and the substitution of monetised value with non-monetarised values. Our argument is that some ASBMs rely on some forms of non-monetised inputs (e.g. gifts of materials, access to land and voluntary labour) in which there is no direct exchange of money. Such gifts reflect inputs that could be provided by monetised relationships, but in these ASBMs there is no financial exchange. Furthermore, the impetus behind an ASBM is not profit-seeking but a coping mechanism to deal with market or public-sector failure.

The development of a new ASBM might eventually become an approach that is copied by others. This is a well-known feature of the business model innovation literature. The Airbnb business model was copied by Wimdu and other companies tried to clone this model (Stone, 2016: 139–140). This is an important point. Cloning is potentially a major problem for profit-maximising firms, but not for ASBMs that are locally embedded and whose primary aim is to overcome some form of

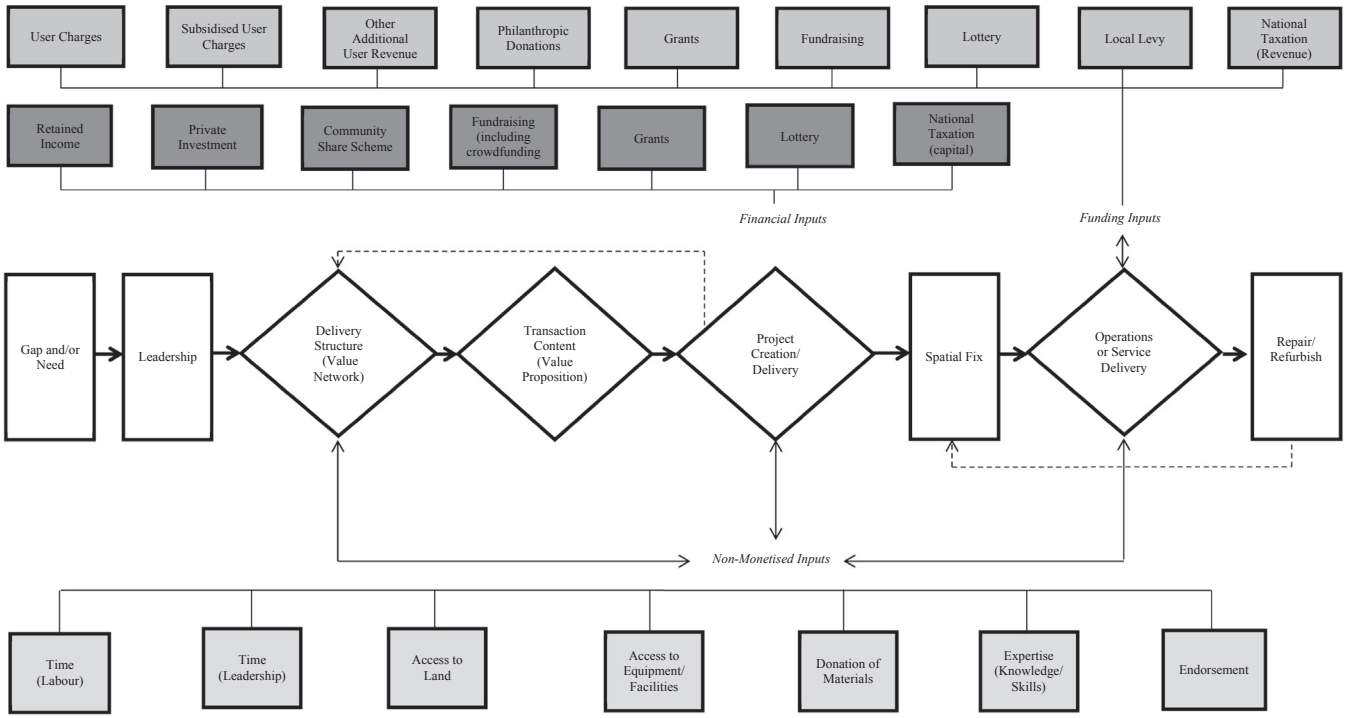

Fig. 1. Alternative-substitute Business Models Conceptual Framework.

place-based infrastructure exclusion. A new ASBM might initially be a new model, a new alternative that is perhaps in opposition to existing business models. This new alternative can be copied and become an accepted or conventional coping strategy (David, 1994; Boyer, 1990; Storper and Salais, 1997; Young, 1993; Ponte and Gibbon, 2005; Cidell, 2012). The next section of this paper describes the research design that was used to identify ASBMs with non-monetised based elements.

3. Research design

The research was designed to develop an understanding of alternative provision of local infrastructure. Data collection occurred in two stages. First, a pro forma was developed based on a detailed review of the business model, alterity and infrastructure literatures. The core elements of a business model were identified and validated at a stakeholder engagement event (April 2014) held to explore alternative business models and the provision of local infrastructure. This included 35 infrastructure practitioners (including transport planners, economic development practitioners, planners, representatives from global engineering consultancy firms, Local Enterprise Partnerships (LEPs) and local and national government) involved in the delivery and management of infrastructure projects. Discussions focused on the identification of key decision-making processes in the provision of local infrastructure through exercises to rank components of business models and working through case examples provided by participants, as well as examples identified by the research team. This was an interactive process that refined the framework.

The second stage required the construction of a database of local infrastructure business projects that included examples of planned, current and historical infrastructure. This database included examples from across hard and soft infrastructure segments based on service delivery rather than parameters of financialization. The approach aimed to capture all types of local infrastructure services and was more inclusive than a classification based on assets (physical and investment definitions) (Ernst and Young, 2011). The sampling process involved two researchers and three methods to develop this database: (1) a bottom-up approach based on the identification and analysis of policy documents and media searches with a focus on the UK; (2) a top-down approach to identify examples of projects from beyond the UK; and (3) a targeted search by infrastructure class. The final dataset included 142 infrastructure projects; 27% were international (Europe, Asia-Pacific, North America) and the rest based in the UK (73%). The focus of this paper is on exploring alternative-substitute local infrastructure business models in the UK with the international projects developed for comparative purposes. Information about the infrastructure projects was obtained from publicly available documentation (published business cases, project websites and policy documents).

Data analysis focused on identifying the components of each business models through systematic analysis. Qualitative coding of the core characteristics of the business models was undertaken identifying themes and common patterns. The analysis identified inputs, actors and network organisations, drivers and values underpinning the core characteristics. Two further stakeholder engagement events were held with infrastructure practitioners (November 2014 and November 2015) to verify the applicability of the business model framework, to review the dataset to identify gaps and omissions and to explore individual cases.

The identification and classification of ‘alternative’ was based on the analysis of the database informed by the alterity and business model literature. A core set of projects emerged that used conventional finance and funding (taxation, user chargers, financialization) methods to construct economically viable models (75 cases, 53%). A second group was identified that used ‘alternative’ value propositions and mechanisms (non-monetised inputs) to construct infrastructure business models (58 cases, 41%). The data collection stopped when additional cases replicated the characteristics of projects already in the dataset and when it became difficult to add additional UK cases to the database. The second group of infrastructure business models were much harder to identify as they tended to be more localised than the first group and much smaller projects. The remaining examples had an alternative value proposition but used conventional finance and funding mechanisms (9 cases, 6%).

The analysis that follows is based on the analysis of the 58 ASBMs identified. This analysis is in two parts. First, the 58 local ASBMs were

Table 1
Characteristics of conventional and alternative-substitute business models.

	Conventional infrastructure business model	Alternative-substitute business models		
		Reach	Innovation	Relics
Description	Market-orientated infrastructure services that use conventional funding and finance methods to achieve profitability or value-for-money.	Enhancement of mainstream service. Works within mainstream infrastructure. Fills gap in provision of mainstream.	Specialised service. Excluded from current mainstream service. Innovation in service delivery.	Redundant asset. Demand for original service reduced.
Delivery Structure: Dominant project leaders	Public-private partnership. District, borough or city council. Private enterprise.	Individuals. Charitable organisation. Community organisation.	Individuals. Charitable organisation. District, borough or city council.	Individuals.
Transaction Content: Dominant values and outcomes	Growth (employment and GDP). Revenue generation. Industry or enterprise development. Service improvement.	Service improvement. Revenue generation. Health and wellbeing. Sustainability.	Connectivity and mobility. Efficiency (cost/energy saving). Heritage.	Heritage. Maintenance of service.
Inputs (monetised and non-monetised)	Finance and funding provided by taxation, private sector investment and use fees.	Finance and funding may be provided via taxation and be subsidised by non-monetised inputs of labour and materials.	Public sector grants, philanthropy, non-monetised inputs, user fees, crowd funding.	Grants, subsidies, user fees and non-monetised inputs.
Number in database	75	23	20	15

Note: The total number reflects the distribution in the infrastructure business model compendium and is not representative of the distribution of alternative and conventional infrastructure business models in the economy.

explored to develop a business model conceptual framework (Fig. 1) that included all types of monetised and non-monetised funding and financing. This framework reveals the ways in which ASBMs are created, but also provides an approach to facilitate comparative analysis. This is not a conventional business model research design as "single-firm cases dominate empirical enquiry" (Foss and Saebi, 2015: 2). Similarly, the literature on the financialization of infrastructure also tends to focus on the analysis of one type of infrastructure or very few cases (Guironnet et al., 2016; Bryson et al., 2017a). The database reflects an extensive research design. In addition, the database was intended to support policy development and citizen action by providing open access to the dataset to facilitate local innovation in the development of ASBMs. An open access website was developed containing the database that can be searched by region, finance methods, funding methods and type of project lead (Bryson et al., 2017b). Second, an intensive research design was then adopted that applied the conceptual framework to explore two examples of ASBMs.

4. Conceptualising local alternative-substitute business models

The alternative has been conceptualised in relation to the conventional, defining alternative as "…anything that the conventional…*is not*" (Sonnino and Marsden, 2006: 185, *emphasis in original*). There are two aspects to infrastructure that may be alternative: the service that is provided and/or the process/mechanism by which it has been provided. These may be delivered using non-conventional inputs for part or the whole projected lifecycle of the infrastructure. It may be that conventional infrastructure is provided using alternative inputs, but there is no difference in the services provided. In this way, ASBM generate a more diverse provision of infrastructure services.

The relationship between users and the providers of infrastructure services in an ASBM is complex; users may be involved in the establishment and delivery of a service through the provision of labour, knowledge, equipment or capital either for direct benefit (individual access to services) or wider community benefit. This user-provider relationship is defined at three stages of an ASBM: defining the need or aim of the service (value proposition); constructing the value network; and delivery. The value proposition of the business model shapes the value network, which in turn shapes the inputs and resources available to deliver the infrastructure enabled services. The business model literature needs to clarify the way in which value is conceptualised. Thus, in this analysis a value proposition is defined as '*transaction content*' or the services delivered by the infrastructure provider. The transaction content may be interpreted or valued differently by users. The value network is a production network, but the terms 'production' and 'network' are perhaps over-used in on-going debates in economic geography and a more appropriate term is '*delivery structure*'. The delivery structure allocates and shares tasks, risks and responsibilities and, where relevant, apportions profits. This alteration to the business model literature reflects the sensitivity to understanding value that has emerged in the alterity debate.

The service delivered by a conventional business model is driven by the need to have a defined service that is economically or politically viable; the geographical reach of these services is in part determined by this requirement. The analysis of the transaction content of the 58 cases identified three motivations behind the creation of ASBMs:

1. *Reach*: enhancing the inclusivity or reach of services by providing services that are currently not available in a location or to retain existing services.
2. *Innovation*: developing niche innovations or infrastructure that is not currently available in this form.
3. *Relic*: extending the lifespan of relic assets often by repurposing.

For *reach*, supplementary forms of infrastructure provision occur to fill a gap in existing provision, in other words these are ASBMs. Infrastructure business models which emerge to fill this gap are enhancing infrastructure provision by finding an alternative means of delivering an existing service that is not available locally (Table 1). For *innovation*, the aim is to create new forms or mechanisms of service provision. Services may be for a defined user group (specialist) or utilise new technology or an alternative approach to addressing service delivery. For *relics*, as cultural and socio-economic conditions change, infrastructure assets remain that are no longer required. These assets still require a degree of maintenance, disposal or repurposing. In the UK relics include horse troughs and drinking fountains, military-related structures, telephone kiosks and heritage steam railways. *Relics* often have strong heritage value, are part of the economy of enrichment and are supported by enthusiasts and residents to either maintain a version of the old service or to repurpose the infrastructure.

Table 2
Monetised/non-monetised inputs for local alternative-substitute business models.

Financial inputs	*Definition*
Retained Income	Capital from accumulated revenue over time.
Private investment	Capital from private enterprises or individuals as loans.
Community share scheme	Sales of shares in a local community enterprise. Shareholders are the primary users of the infrastructure and receive a return on investment.
Fundraising (including crowdfunding)	Capital from a large number of people with each providing a small donation. Crowdfunding may be facilitated by on-line social networks or other enterprises, and funders may not necessarily be able to access infrastructure services, although their investment may be rewarded by some type of return.
Grants	Capital provided against a proposed project by an external organisation with no expectation of capital repayment.
Lottery	Capital through the purchase of a ticket by the general public in return for the potential to win a prize.
National taxation (capital)	Capital allocated from central government's tax income.
Funding inputs	
User charges	Direct payment by users to access the infrastructure.
Subsidised user charges	Direct user charges are reduced by an indirect national taxation subsidy or annual grant. Revenue may be guaranteed by government support schemes.
Other additional user revenue	Payment from additional users, for example advertising revenue.
Philanthropic donations	Funding required for operating and maintaining the infrastructure comes from charitable giving. This may include an endowment.
Grants	Funding acquired from grants given by the government or non-government organisations.
Fundraising	Funding from the general public.
Lottery	Capital or revenue inputs provided by a lottery.
Local levy	Levy imposed on communities to support specific development.
National taxation (revenue)	Revenue allocated from central government's tax income.
Non-monetised inputs	
Time (labour)	Volunteer time that does not use individual's expertise.
Time (leadership)	Volunteer time to support the management and leadership of initiatives, often over a sustained period.
Access to land	Private individuals or businesses allow access to property free of charge.
Access to equipment or facilities	The use of equipment or facilities free of charge.
Donations of materials	Materials provided free of charge.
Expertise (knowledge or skills)	Individuals provide expertise free of charge.
Endorsement	Support of high profile individuals (celebrities, businesses, political and royal representatives) and access to brands free of charge.

Infrastructure business models combine assets and operational procedures to deliver a service to users. Many infrastructure services work within the established conventions of finance and funding to deliver business models that have a return on capital investment that can be monetised and subjected to financialization. This includes the provision of water and electricity and toll roads/bridges. ASBMs deliver services using a different set of inputs in addition to, or instead of, established conventions in financing and funding. These non-monetised inputs are critical for infrastructure development and operation. Non-monetised inputs are combined with financial inputs enabling service delivery. This may be in the form of a substitute for funding and finance that is later replaced by paid labour or may replace previously paid labour for example paid librarians replaced with volunteers. Non-monetised inputs may be required throughout implementation and delivery because the infrastructure could not be provided in any other manner.

The transaction content of ASBMs combines different inputs and values by engaging different actors and forms of non-monetised inputs in a delivery structure. Shared values and norms facilitate the development of this delivery structure and increase the ability to negotiate access to non-monetised inputs based on voluntary labour, the provision of free materials and other inputs that are provided without any expectation of a direct financial return. An individual involved will have two types of return for their investment in time and effort: (i) access to the service and (ii) showing a sense of community commitment. ASBM project leaders come from non-profit-, charitable- and community-organisations, as well as individuals and local authorities. The involvement of these key actors helps draw together local resources including knowledge and access to equipment. Conventional infrastructure business models are based on dominant values of economic growth and service improvement, including increasing availability of supply and increased connectivity (Table 1). The diversity of ASBMs is reflected in the variety of values and resources that form the transaction content including monetised and non-monetised inputs.

The business model construct enabled a conceptual framework to be constructed based on the analysis of the 58 infrastructure projects that identifies the key stages and inputs required to create an ASBM (Fig. 1). Four primary decision-making points exist within this framework (diamond shaped in Fig. 1): (i) *Delivery Structure (Value Network*; (ii) *Transaction Content (Value Proposition)*; (iii) *Project Creation/Delivery*; and (iv) *Operations or Service Delivery*. The development of a new local ASBM can commence at any decision point. Any change in a primary decision point affects decisions that are made at other decision-making points.

The first primary decision point is the *Delivery Structure*. It includes decisions regarding the identification of a gap or need for infrastructure-enabled services, leadership and the network architects. Network architects take a leadership role in developing and coordinating the delivery structure. This is a process of negotiation between members involved in an emerging delivery structure including identifying specific solutions and negotiating volunteer contributions. The second primary decision point is the *Transaction Content* or the identification of the content/services that may be created by the infrastructure and this includes economic, social, community, and environmental values. The third key decision point is *Project Creation* including the technological/engineering solution and the identification of financing/funding and non-monetised inputs. The decisions at this point affect the composition of the delivery structure. The members of the delivery structure involved in a local ASBM make decisions regarding the monetised and non-monetised inputs required to deliver the service. A complex iterative negotiation process occurs between the delivery structure, transaction content and project creation. The interaction between these decision points reflects the feasibility of the business model and depends on the right blend of non-monetised and monetised inputs to achieve the anticipated outcomes. The 16 financial inputs (capital) are shaded by darkest greys (top two rows) and the seven non-monetised inputs, or substitutes for capital, are shaded by light grey at the bottom of Fig. 1. These monetised and non-monetised inputs were identified from the analysis of the 58 projects (Table 2). Different methods and combinations of finance and non-monetised inputs emerge over time as the legal, technological and political context alters. Different types of financial and non-monetised inputs can be

used individually or combined. The outcome of an ASBM is a spatially fixed engineered solution with a related or embedded business model. The relative permanency of infrastructural investment leads to what has been termed a "financialization fix" that combines a development solution for a specific site with a financial model creating a locally embedded designed structure. This "fix" is a solution that locks out alternative place-based solutions (Bryson et al., 2017a: 458).

Non-monetised inputs included donations of materials, expertise (knowledge or skill) or endorsement. These inputs are provided by individuals, community groups, social enterprises, businesses or the public sector. Although donations of materials, equipment and facilities may have a direct or indirect monetary value, these inputs have not been paid for within the ASBMs and did not require finance or funding. For instance, public sector providers may be providing services (e.g. time) that are paid for by the public sector but are not charged directly to the project. Some inputs may be closer to market than others. A donation of labour to undertake a specific tradable skill has a market value, whereas a donation of labour by a skilled individual that does not utilise their skill set is less easily monetised; for example, an accountant volunteering to dig a trench. Philanthropic donations and forms of fundraising (including crowdfunding) were common but these are 'alternative' monetised inputs. Hybrid ASBMs form in which non-monetised inputs substitute for some parts of what would conventionally be monetised inputs.

The fourth primary decision point is *Operations or Service Delivery*. It involves identifying funding or revenue packages to support operations and maintenance. Nine primary ways of funding ASBMs were identified from the database. These options are shaded by dark grey at the top row of Fig. 1. These nine funding sources can be used on their own or in some combination (Table 2). Additionally, non-monetised inputs can be deployed at the management delivery stage. It is worth noting that there is no linking circuit between financial inputs and funding (revenue) packages, as financial (capital) inputs may not necessarily need to be repaid.

5. Alternative-substitute business models – Application of the conceptual framework to broadband and gas lighting

Historically, philanthropy was a significant funding/finance source for infrastructure provision including hospitals and hospices (Owen, 1964), memorials (Gaffney, 1998) and the development of schools, water and sewage systems and housing (Garside, 2000). Public subscription schemes financed infrastructure, such as Admiralty Arch and the development of the route from The Mall into Trafalgar Square, London (Bradley and Pevsner, 2003: 655–656). Community share schemes have been developed as ASBMs to create local renewable energy schemes (such as Tidal Lagoon Swansea Bay, UK, and Middelgrunden Wind Farm, Denmark). Crowdfunding, as a form of public donation catalysed using social media, has been used for ASBMs to create green infrastructure schemes such as the Low Line (New York, USA) and Luchtsingel Bridge (Rotterdam, The Netherlands). These forms of philanthropic and community investment have paved the way for the provision of important local infrastructure that is additional to the services provided by the public and private sectors. These examples highlight how conventions in local infrastructure finance and funding methods have evolved; philanthropy had been a mainstream financing method for the provision of infrastructure, but was replaced by public and private finance. What we now consider 'alternative' is defined by current conventions and, in the past, some of these alternatives were conventional methods for financing and funding infrastructure. But, infrastructure exclusion has always existed and one coping strategy has been the development of locally created ASBMs.

Infrastructure services provided by ASBMs are common, often small scale and ignored in the infrastructure literature. Non-monetised inputs, particularly in the form of volunteers, are used to deliver critical and non-critical services, in rural and urban locations. These inputs may be less visible as they often support conventional inputs (finance, paid labour, etc.), but are critical to the ongoing functioning and delivery of infrastructure services. A volunteer workforce is a key asset for some critical infrastructure services including fire and rescue services, hospitals and hospice care, libraries, cultural heritage and broadband (Royal Voluntary Service, 2015). Hospices benefited in the UK from services provided by 125,000 volunteers in 2006, which had a monetary value of £112million (a potential increase in the cost base of ~25%) (Hospice UK, 2016). Library services in the UK have seen a significant rise in volunteer labour to maintain services following public sector cutbacks from 2010; 174 libraries have been transferred to community groups, with a 25% reduction in paid staff between 2010 and 2015.

Non-monetised inputs are used broadly within ASBMs. Two cases are considered to examine the application of the ASBM conceptual framework to exploring the provision of local infrastructure with a focus on reach, relic and innovation:

1. Reach: Broadband 4 the Rural North (B4RN), UK.
2. Relic and Innovation: gas lighting, Malvern, UK.

These are intended to explore the different ways ASBMs are developed to provide alternative services. The length of this paper limits the analysis to two cases, but the two cases were selected from the 58 on the basis that they included the core features of the ASBM conceptual framework. Additionally, one represents a relatively new infrastructure service, broadband, and the other a relict form that is an example of the 'economy of enrichment' in which value is related to the economic exploitation of the past (Boltanski and Esquerre, 2015).

The cases explore the role of non-monetised inputs at different stages of an infrastructure asset's lifecycle and ways of integrating monetised and non-monetised inputs. Each case examines the key decision points in the ASBM conceptual model: *Delivery Structure*; *Transaction Content*; *Project Creation*; and *Operations*. Alternative methods of delivery combining non-monetised and monetised inputs are present in the delivery of mainstream or what could be defined as essential infrastructure (broadband, transport systems and street lighting) but often their role is hidden.

5.1. Service reach: Broadband 4 the Rural North (B4RN)

The mainstream provision of infrastructure services can create gaps in provision and marginal coverage, which has been particularly challenging for rural communities. In the UK there are currently 12 community-based broadband ASBM initiatives. *Broadband 4 the Rural North* (B4RN) is a community-led organisation that has planned, installed and operates a high-speed broadband service for residents in a rural part of the north of England since December 2011. This is a place-based, targeted scheme with a restricted geography providing broadband to 3200 properties in 21 parishes (Forde, 2013). The service is of high quality, providing a 1 GB fibre home broadband connection. The driver for the development was a gap in provision from the national rollout of quality broadband services into rural areas by private providers in the UK. The upgrade offered to the community by this government subsidized initiative was a limited 2Mbs speed, compared to the 30Mbs achieved through the Next Generation Broadband rollout.

This local ASBM provided a well-established technology, but extended its reach through an alternative delivery process to an area experiencing infrastructure exclusion. The project aimed to deliver high quality broadband to all residents in a defined area regardless of the cost efficiencies of connecting particular residences to the network (i.e. distance to network). The value of full inclusivity underpinned the project and differentiated it from the cost efficiency determinant of the national rollout scheme. B4RN is the result of a social community process to overcome digital exclusion; there was no local conflict between participants in this process as the alternative was to continue

without access to broadband services. Filling this gap required the identification of a technical solution and a linked business model. This required technical and organisational expertise as well as leadership. A key issue for other places is the availability of local leadership willing to identify and mobilise local resources.

The project was initiated and led by a community group established to develop the infrastructure by drawing together a delivery structure of skilled local individuals with related expert knowledge. These community members had skills but also an enthusiasm and commitment to deliver a high quality local community service. Combined with local knowledge of the sites and appropriate businesses to support the delivery of the infrastructure, the delivery structure planned, implemented and operates the service. The organisation which owns and operates the network is a *community benefit society* (CBS). As a CBS, the assets are owned by the community and cannot be sold and consequently donations of time and money directly benefitted the community rather than a single individual or firm. This reduced the potential for any community conflict encouraging a diverse group of individuals to support the project.

The project delivery process required non-monetised and monetised inputs in the form of knowledge networks, voluntary labour, free access to land and equipment, and financial investment. The delivery structure included residents and supporters with a high level of expertise in engineering, technology and network management (B4RN, n.d.a). Access to private land (wayleaves) and equipment (heavy machinery for digging) for no charge was negotiated with residents enabling cable laying and the construction of engineered structures. Capital was obtained through a community share scheme. Investors in the share scheme are residents who directly benefit from service delivery; investment risk is partly offset by tax incentives (Forde, 2013). Investment could also take the form of volunteer labour, which was monetised at an agreed level (below market rates) and equated to a shareholding. This bottom-up approach enabled a delivery structure to develop based on individuals donating time and expertise.

The delivery of the service is supported by user fees (both connection fees and service rental subscriptions). Despite this eventual funding stream, during the initial operational period volunteers were still required. Once connections reached a sustainability threshold the CBS was able to generate a revenue stream sufficient to support paid employees to manage service delivery (as of January 2016 there were 10 paid employees) (B4RN, n.d.b). When the CBS is profitable, shareholders will receive an annual dividend and will be able to withdraw their investment. The scale-up of the service is vital to achieve the required revenue to offset delivery-related costs. This is an example of a hybrid or multi-sided business model (Rochet and Tirole, 2006) with built-in evolution to reach a sustainable end point: a financial business model exists, but this was not viable without non-monetised inputs at the development and implementation stages. Voluntary support from residents in allowing free access across properties (wayleaves) reduced the physical distance required for groundwork reducing costs including materials (Forde, 2013). Although the inputs required are similar to those required by a private provider (materials, labour, knowledge), they have not been accounted for in this financial model, thus reducing capital costs and user charges.

B4RN became a ‘mainstream business model’ once a revenue stream developed that was able to support paid work, but development costs were far lower due to the non-monetised inputs that were not costed into the business case. This project is one in which an ASBM formed, but transitions to become a more conventional business model but it is still an ASBM as it was underwritten by non-monetised inputs. Residents obtained values including access to broadband services, a share in an infrastructure asset and a project that enhanced a sense of place and community engagement.

5.2. Repurposing relics for the 21st century: Malvern Gas Lamps

Changes in the demand for local infrastructure services due to technological innovation and social, cultural and economic change produces obsolescence and creates relict infrastructure assets. Repurposing of assets by community groups has become common in the UK as relic assets, that have become part of the streetscape, require continued maintenance or technological innovation. Such repurposing includes converting telephone boxes to libraries or phone charging stations, or disused toilet blocks to community spaces, bars or art galleries. This reflects reusing assets to provide new alternative services and are place-targeted initiatives by local community groups and individuals. In the town of Malvern, Worcestershire, UK, a network of heritage gas powered street lamps was under threat to be replaced by the local council, Malvern Town Council (MTC), by electric lighting. The decision to replace this lighting was partly about reducing maintenance and running costs but also increasing service quality.

The 104 gaslights were valued by residents and tourists for aesthetic, heritage and cultural reasons. There is a literary association with a popular children's book by C.S. Lewis. Lewis spent 1913–14 at school in Malvern and the lamps are said to have inspired the lamp in his book - *The Lion, the Witch and the Wardrobe*. The lights are very much part of a valued place-based “economy of enrichment” (Boltanski and Esquerre, 2015), but this was a heavily contested economy. MTC needed to identify financial savings and some members of the community argued that the gas lights were not fit for purpose as they provided limited illumination compared to LED street lighting. But, there was much resistance by residents who wanted to retain the heritage associations of the lamps. In 2010, *Transition Malvern Hills*, a community environmental group, part of the Transition Network, established “*Transition Gasketeers*” or an extended delivery structure to work with MTC to identify a financially viable solution to retain the lamps. The Gasketeers researched ways in which the lamps could be reengineered and improved and persuaded MTC that they should be retained. The Gasketters had not anticipated that MTC would ask them to tender for this work with the support of a local design firm, Sight Designs Ltd. With considerable reluctance they agreed to tender and a hybrid ASBM formed part-based on volunteer inputs supporting local employment.

The gaslights were re-engineered by replacing the mechanical timer controls with sensor-based electric controls and efficiency/effectiveness was increased by adding reflectors to the lamps (Transition Malvern Hills, 2010). The operation and maintenance costs of the lamps was reduced with an 80% reduction in the carbon footprint combined with a higher light output (Transition Malvern Hills Lighting Group & Sight Designs Ltd, n.d.). MTC retained responsibility for maintenance and operations. To adapt the lights required significant volunteer effort over two years. Volunteers undertook the adaptation and restoration of the lamps between December 2010 and 2012; the cost of restoration was not economically viable without volunteer labour.

The Malvern gas lamp project represents the survival of obsolete infrastructure through community-led innovation to develop a novel technical solution. The ongoing maintenance, energy costs and labour inputs required to maintain the lamps was prohibitive, particularly after MTC withdrew a maintenance grant (Transition Malvern Hills, 2012). The development and application of new technology to an historic asset enabled the community group to develop a solution providing value for money whilst retaining heritage values. Non-monetised inputs, both knowledge and labour, were used to adapt and restore the lamps. These inputs provided a critical service (refurbishment) enabling the lamps to be converted from old to new technology. Once the gaslights had been re-engineered, reducing operating costs, the assets could continue to be operated by MTC using conventional funding. In this case, a temporary hybrid ASBM was developed to retain an historic asset based on a delivery structure including volunteer labour, a local community organization and a local business.

6. Conclusion

Local infrastructure plays an important role in facilitating everyday living. Initially, such infrastructure was provided by local people to meet local needs, and subsequently was provided by the local state and more recently by the private sector. These different modes of local infrastructure provision reflect time- and place-based conventions (Bryson et al., 2017a). In the UK, most local infrastructure is provided by the public and private sectors, with some provision by the third sector. In most localities, infrastructure exists that reflects previous modes of provision as well as combinations of provision by the public, third and private sectors. Local infrastructure is not ubiquitous and there are gaps in provision. These gaps reflect difficulties in extending the geographic reach of some infrastructure services resulting in place-based infrastructure exclusion. These gaps provide opportunities for the development, by groups of local individuals, of ASBMs.

This is not a conventional paper about alterity or business models, but rather a paper that explores business models through the lens of alterity and the on-going debate on the financialization of infrastructure. These are very different debates. The financialization debate is about institutional investors and the creation of infrastructure assets focussing on national infrastructure and major capital works (O'Neill, 2018). This focus on funding and financing shifts the analysis away from the services that are provided by infrastructure. Developing a dialogue between the debates on infrastructure, alterity and business models returns the focus of the debate to a discussion about service provision combined with the development and operation of conventional (financialized/public sector) and alternative modes of infrastructure provision. Thus, O'Neill's recent review of the debate on infrastructure capital projects notes that "central to our understanding of the delivery of urban infrastructure is the role of the state in infrastructure commissioning, financing and operations" (2018: 345). We agree, but also disagree. The difficulty is that the sole focus of this debate is on infrastructure that can be converted in to a financial asset, but this raises the question of private- and public-sector failure and the existence of gaps in infrastructure provision. Understanding the nature of these gaps and the development of ASBMs to ensure local access to infrastructure services is an important omission in the longstanding debate on the construction and financialization of infrastructure.

The business model debate provides a framework for exploring the mainstream economy. This paper is the first to develop a structured approach to business models based on the development of a conceptual framework developed from the analysis of 58 business models. Thus, no existing papers on business models contains anything like the business model conceptual framework developed in this paper. Our framework provides an approach for comparing different ASBMs but also, with modification, for exploring infrastructure business models that have been financialised. The business model literature emphasises delivery processes providing opportunities to create and appropriate profit but has ignored the debate on alterity and the emphasis placed in this debate on non-capitalist activities and non-monetarised elements. Developing a dialogue between the business model and alterity debates raises a series of questions about the existence, development and operations of ASBMs that include non-capitalist elements. There is a real danger that the debate on business models and infrastructure assets ignores the ways in which non-monetarised inputs play an important role in providing access to infrastructure services. A key issue is that the provision of infrastructure is a socio-spatial process, a financialization fix (Bryson et al., 2017a), and this leads to unequal access that can be sometimes overcome by the development of alternative modes of infrastructure funding and financing.

Bringing these literatures together highlights two problems with the business model literature. First, this literature does try to deal with alternative approaches to doing business, but the focus has been on profit-centred business models that include social values. Second, the literature on business models positions value as a core concept, but there are many different types of value (Mazzucato, 2018). For Malvern gas lights the definition of value was related to heritage and the status quo whilst for *B4RN* value was defined in relation to accessing Internet provided services; in neither case was value defined in monetary terms. The ASBM conceptual framework developed in this paper presents a different approach highlighting the contested nature of value. The purpose of this framework is to identify the bundles of financing/funding and non-monetised inputs that are assembled as part of a delivery structure to provide a place with access to an infrastructure service. This framework has been developed through the analysis of 58 ASBMs and its application explored through two cases. Each of these 58 cases has developed a different bundle of financing/funding and non-monetarized inputs. A key issue is 'how these ASBMs emerge'? This involves two factors. First, a response to an absence; a place in which residents do not have access to an infrastructure service. Second, is the coming together of residents to create a delivery structure by blending expertise with finance/funding and non-monetarised inputs to deliver a service. Local leadership is important here. A key research gap is to explore those places that experience some form of infrastructure public/private sector failure, but do not develop a viable ASBM.

The emphasis that has been placed on reach, innovation and relics highlights different drivers or motivations for the development of ASBMs. All three are very different. The reach example represents the delivery of a modern service to an area with marginal demand given the constraints of conventional business models based on a return on invested capital. Nevertheless, a local delivery structure can form using non-monetised inputs to develop a local solution. Relic infrastructure emphasises the transformation of infrastructure into heritage. This reflects the relationship between a streetscape and local infrastructure, but also the relationship between local infrastructure and place-based identity.

The business model conceptual framework provides an important tool for identifying, exploring and comparing different forms of alternative infrastructure provision. New forms of non-monetarized and monetarized forms of finance and funding can be added to this framework as they emerge. In addition, the conceptual framework can be developed, modified and applied to conventional modes of infrastructure financing. This development would go some way towards facilitating the comparative analysis of financialization and its impacts including a discussion of different forms of value within business models. The development of an on-line searchable database of ASBMs (Bryson et al., 2017b) is part of a novel research design that provides policy-makers, citizens and academics with access to a resource intended to encourage the development of new forms of ASBMs. This on-line resource, combined with the conceptual framework, are intended to facilitate local discussions regarding the development of local solutions to provide access to infrastructure services.

Local ASBMs play an important role in the everyday lives of many people. These business models are embedded in local delivery structures reflecting local needs and resources, but they are geographically uneven rather than inclusive solutions to infrastructure exclusion. The best solution to the provision of local infrastructure is one that is facilitated by collective provision co-ordinated by the state ensuring that all citizens have equal access. The development of ASBMs reflects public and/or private sector failure. On the one hand, these alternative solutions provide unequal access to infrastructure and are a partial solution to uneven provision. On the other hand, the alternatives reflect innovations that might be eventually scaled up to increase access to infrastructure-enabled services. The identification and analysis of ASBMs in this paper also highlights the symbiosis that exists between conventional approaches to the provision of local infrastructure and alternative approaches.

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